



**STRATEGY
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RAILROADS IN THE CIVIL WAR: A STRATEGIC PERSPECTIVE

BY

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USAWC STRATEGY RESEARCH PROJECT

Railroads in the Civil War: A Strategic Perspective

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ABSTRACT

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The Civil War was the first opportunity to demonstrate the full military value of the railroads. The railroads played a vital part for both the North and South and the final outcome of the war was ultimately influenced by the use of the railroads. The North was in far better shape at the outbreak of the Civil War with about 21,000 miles of railroad under its control compared to the South that had only about 9,000 miles. The majority of the locomotive manufacturers and other construction facilities were in the North allowing them to maintain or increase their supply of equipment. The South on the other hand lacked almost everything. Not a single plant could manufacture a locomotive under wartime conditions. This combined with the type of rail used were a great detriment to the South. Visionaries of railroad uses were abundant in the North, yet few in the South were given the same latitude to accomplish heroic feats. Railroads played a key part in almost every battle of the Civil War and the lessons learned from its usage helped us exploit the possibilities in every future war.

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RAILROADS IN THE CIVIL WAR: A STRATEGIC PERSPECTIVE

On February 28, 1827, the state of Maryland chartered the Baltimore & Ohio – America's first common-carrier railroad – marking the true beginning of the development of the nation's rail system. More than 170 years later, that same railroad, now part of CSX Transportation, is still operating.

In the days before railroads, the only forms of transportation were by water routes and horse-drawn vehicles. Water was the best mode because most roads were dirt and subject to weather year round, and the cost of hauling over the few relatively good toll roads was very high. Water transportation had the advantage of low cost, but this mode of transportation had its limitations too. First of all, the traveler could only go where the streams and rivers went. This could be solved by the construction of canals but, there was no getting around the problem of bad weather which made some waterways impassable for long periods.

The development of steam power focused the people's hopes on the steam locomotive as a solution to their transportation problems. The first American-built locomotive to operate in rail service was the Tom Thumb. During its trail run on August 28, 1830, this one-horsepower locomotive outdistanced a horse-drawn rail car in a celebrated race over the Baltimore & Ohio's tracks. Although a malfunction caused the Tom Thumb to eventually lose the race, it did draw early attention to the potential of railroading. On Christmas Day in 1830, scheduled passenger service was inaugurated by another American-built locomotive – the Best Friend of Charleston – over the lines of the South Carolina Canal and Railroad Company which is now part of the Norfolk Southern system.

To see any great future for railroading took a lot of imagination. First, the locomotives were noisy and threw off great amounts of smoke and sparks. Next, the tracks, which were wooden rails topped with iron, had an annoying habit of coming apart. But there were people who had imagination. They saw the promise of a rapid, all-weather transportation to all parts of a fast-growing nation. Those people spent their energy and money to see their dream come true. And it did.¹

Before the invention of the railroad, armies moved and resupplied via horse or on foot with some limited use of water transportation. So substantial were the impacts of railroads on the Civil War that it could have been called the "Great Railroad War."² The Civil War, the "first real railroad war",³ was the first opportunity to demonstrate the full military value of the railroads. It "was the first major military action in which railroads served to any degree."⁴ The railroads played a vital part for both the North and South and the final outcome of the war was

ultimately influenced by the use of the railroads. Once the advantages of rail transportation were realized, the side that was able to leverage these advantages to their benefit would ultimately be victorious.

STRENGTHS AND WEAKNESSES OF THE NORTH

The North was in far better condition at the outbreak of the Civil War than was the South. "Of the 30,000 miles of railroad in operation in America at the outbreak of the war, only about 9,000 miles lay within the Confederacy."⁵ The roads in the North were "more adequately financed, (and) were of heavier construction than those in the South."⁶ Prior to the Civil War commercial companies owned and operated the railroads. Therefore they were designed to enhance commerce in each region. The companies of the North had been farsighted enough to design them "to connect one city with another and with inland waterways as well as with ocean ports."⁷ They had developed a railroad system. The companies were aware of impact this had on business but no one could have foreseen the impact that this foresight would have on the prosecution of the war.

Up until the Civil War when the military needed to use the railroads for movement of supplies, either the War Department or the individual Army Commanders would contract with the private companies for the movement. The supplies would move along with the commercial goods. This could lead to unanticipated delays and disruption in time of war or other crises. In April 1861, President Lincoln seized control of all the railroads in the North so that priority could thus be given to the movement of military supplies and equipment and thus aid in the prosecution of the war.⁸ "On February 4, 1862 (although this date varies depending on the source), Congress passed an act authorizing the President of the United States to take possession of any and all railroad and telegraph lines, if and when in his judgment the public safety should require it. The authority extended to all rolling stock and equipment and enabled him to place under military control all officers, agents and employees and operate the lines as part of the military establishment."⁹

Not only did the North have the advantage of interconnected rail lines they also had the resources and manufacturing capability. "The North had no less than a dozen established locomotive manufactures as well as numerous railroad and other shops in which construction was possible."¹⁰ Throughout the war, "the North was able to maintain or increase their supply"¹¹ of equipment. Locomotives increased from 112 to 148 between 1863 and 1865 while freight cars increased from 2,312 to 3,337 on the Central Illinois.¹² Both the North and the South had limited sidings at the beginning of the war. Sidings are used for several purposes.

First to allow trains to pass one another without interfering with the flow of traffic. Sidings also permit the rail cars to be stored temporarily while not needed. The North corrected it during the war while the South lacked the iron to correct it. While neither side ever had standard gauge the North did have "newer and more durable T-type rail."¹³ In addition to its superior quality, "T" rail could be re-rolled and thus used again.¹⁴

STRENGTHS AND WEAKNESSES OF THE SOUTH

The South lacked almost everything necessary to build and maintain railroads. Unlike the North, where the private companies saw the advantage of interconnecting rail lines, the Southern companies avoided rather than sought the interconnection especially with their prime rivals, the port cities.¹⁵ "Many companies had intended to serve only as feeders to so established waterway, or as routes of local trade."¹⁶ Thus, it was not unusual in the South to have rail lines end with the start of the next line several miles away. An exception to this was Richmond, Virginia which was "situated beside the navigable James River, enjoyed the most extensive railroad service of any city in the South"¹⁷ and it was also the terminus of five railroads. Still the South lacked a railroad "system."

As previously mentioned, it is important to note again that neither the North nor the South had standard gauge or adequate sidings at the beginning of the war; the South, unlike the North, lacked the iron to correct the lack of sidings thus it became a constant affliction throughout the war.¹⁸ Their "bridges were normally no more than elaborate wooden trestles of spindly appearance and, occasionally, of terrifying height."¹⁹ The use of timbers left the Confederate bridges "highly susceptible to serious damage either by freshet or by fire."²⁰

The South had "not a single plant in which a locomotive could be built – at least not under wartime conditions."²¹ They continued to use U-type rail and "...tie treatment (creosote) had not been developed and the older tracks were beginning to suffer rapid deterioration from rotting timbers."²² The Southern rail was made from "soft iron" meaning that "ties were laid in the usual manner and long squared timbers or stringers were then placed across them; the iron rails were then spiked to the top surface of the stringers."²³ Thus the heavy traffic of military cargo over these lines caused them to wear quickly and they frequently got out of alignment. Add to this the impact of the North's blockade that prevented supplies from reaching the South where they were desperately needed. Although some lines had stockpiles of rails, most of these were confiscated by the Confederate Navy to reinforce their ironclad vessels.²⁴

On February 26, 1861, President Davis signed an enactment of the Provisional Congress that established a Quartermaster Department, which "was charged with the

transportation of troops and supplies."²⁵ However, this organization remained mostly on paper for the duration of the war.

It "became apparent that the Confederacy's use of railroad supply lines could not continue upon the existing informal basis without endangering the entire war effort."²⁶ There was no coordination and local quartermasters believed that their agreements with the local railroads would be sufficient to solve any transportation problems encountered. When the railroad companies disagreed with any local requirements, they would simply bring their problems to the attention of President or the Secretary of War along with threats of retaliation. Due to this political pressure, the Confederacy was never able to exert any effective control over its railroads.

In July 1861, a bill was introduced authorizing President Davis to regulate and take control of the railroad in certain cases. "...The measure would have given Davis wide authorization over the operations of the carriers and have permitted seizure of the recalcitrant roads."²⁷ But, because of its sensitive nature, the "excessive Confederate faith in the doctrine of States' Rights" and belief that "private interests were to remain inviolate,"²⁸ this provision went unapproved for almost 2 years. By the end of 1861, the South's railroads were threatened with "vital problems of physical properties and financing" while the North had only minor problems of "control and operation."²⁹ This remained the same throughout the Civil War.

The one advantage the railroads did give the Confederates was that of interior lines. "So long as the majority of those lines remained intact, the southern front might give ground, but it did not suffer a collapse."³⁰ The Confederates also became quite skilled in the art of rail destruction. They would remove just a few rails, which was enough to cause a derailment and thus disrupt the North's movement.³¹

THE CENTRAL FIGURES

In 1838, MG Edmund P. Gaines, USA, developed the first comprehensive, integrated plan to construct railroads for speedy mobilization and movement of troops. He suggested construction by the Army of seven strategic railway lines, radiating from Kentucky to Tennessee, then the central areas of the nation and on to the several frontier areas. Other lines would radiate from Memphis to Charleston, S.C. or to Savannah, GA, and onto the Indian Territory. None of these lines was built by the military, but the vision of General Gaines was so sound and true that all of them, later constructed for commercial use, had important strategic value for military purposes.³²

“That man Haupt has built a bridge across the Potomac Creek, about 400 feet long...and, upon my word, gentlemen, there is nothing in it but beanpoles and cornstalks.”

President Abraham Lincoln

Herman Haupt was the force behind the North in successfully utilizing and maintaining rail power. He was a railroad engineer by trade and moved up through the ranks of the Pennsylvania Railroad becoming its Chief Engineer by 1853. His engineering feats were well known. It came as no surprise when Secretary of War Stanton sent for Haupt to provide assistance in the reconstruction and operation of the rail lines in northern Virginia which served the Army of the Potomac. Haupt wasted no time in organizing his “troops.” Although soldiers were initially detailed to work for Haupt, he preferred already trained civilians in the Construction Corps of the Military Railroads.³³

At Manassas Junction, Virginia, Haupt and his construction team set a record in repairing the site, which had been estimated to take well over two days. Confederates had loosened the brakes on numerous cars at the summit and let them roll until they hit the Manassas Gap where they piled up. After repairing five bridges over Goose Creek, Haupt quickly moved his team into action to repair this track. The cars that were blocking the track were thrown down the hillside and the ties and rails, which had been removed by the Confederates, were brought back up the embankments, repaired and put in place. In less than 6 hours, Haupt was on the locomotive steaming over the repaired track on his way to Front Royal.³⁴

Another tremendous feat accomplished by Haupt and his crew under sub-standard conditions was the building of the trestle bridge on the Richmond, Fredericksburg and Potomac Railroad over Potomac Creek. Haupt and his crew completed the bridge in nine days. This was a substantial feat for several reasons. First, the soldiers were ill equipped, with limited food and tools. Further, they had to work under a steady rain that even today would cause great concern when doing bridgework. When completed, this trestle contained over two million feet of lumber most of which was cut from nearby trees.³⁵ The aforementioned quote from President Lincoln refers to what he observed when he saw this trestle bridge for the first time.

Although a master at reconstruction, Haupt was also a master of destruction. He devised a method that was both practical and expedient to destroy the enemy rail lines. By using a horse and items already on the rails, rail could be pulled and either bent or broken. If possible, repair of lines damaged in this manner was labor intensive.³⁶ He also recommended two additional uses for torpedo devices. One was in the demolition of bridges so they could not

be readily repaired. The other use was in firing a cannonball through the boiler of a locomotive. This would ensure that engine repair by the enemy was almost impossible.³⁷

Haupt also devised a military truss bridge that could be used in a wide variety of situations. Assembly was easy as the pieces of timber were all alike and therefore fit into any position. The pieces could be cut well in advance of need and then rapidly moved to the construction site. The only items that the road crews needed would be saws and augers, "in addition to a set of block and tackle for hoisting the timbers into position."³⁸ The United States Military Railroad also operated car ferries or car floats during the Civil War to connect "various roads which have their termini on navigable rivers. This method saved waste and expense, reduced the risk of capture of supplies in the face of enemy advances, and suggested that opportunities for similar operations might exist on the Ohio and Mississippi Rivers."³⁹ Haupt developed train schedules or timetables for several reasons. First, the telegraph lines were strung along the railroad tracks normally controlled train movement. If the enemy was able to cut those lines, then control of the trains was lost. Since most were single track with limited sidings, the loss of the telegraph made the trains "virtually blind." Increases in accidents and delays were all attributed to this problem. Haupt realized that if he could establish set schedules, and then even if the lines were cut the trains could still move according to the schedule, and thus, not be impaired by the lack of telegraph.⁴⁰

Thomas A. Scott began his railroad career in Pennsylvania in 1850. He started the first military telegraph office at the start of the Civil War. Andrew Carnegie, his assistant, "recruited four telegraph operators from the ranks of the Pennsy brass-pounders to form the nucleus of the Military Telegraph Corps."⁴¹ In 1861, he was placed in charge of the railroads and telegraphs used by the Union and later that year he was appointed Assistant Secretary of War. His contributions to military railroading are many including the "creation of transportation and telegraph bureaus to take charge of the military communications, railroad and water transport; he helped plan the large-scale movements of troops to the western theater of the War and prepared reports of transportation problems."⁴² He was able to arrange for limited exemptions from the draft for locomotive engineers and some mechanics, as their expertise was vital to the successful operation of the railroads.

MG Daniel McCallum grew up in upstate New York and went to work for the New York and Erie Railroad where he studied engineering and architecture. In 1854 he was named General Superintendent of the New York and Erie lines. By the start of the Civil War, McCallum was president of his own bridge company which specialized in railway bridges. In 1862, he received an order from Secretary of War Stanton that "appointed McCallum as military director

and superintendent of railroads in the United States."⁴³ Along with his appointment came the power to take over railroads, equipment and whatever else he deemed necessary in order to move the troops, military equipment and supplies where and when they were needed. He handled this power expertly and managed to accomplish the actions with minimal problems and little friction. The biggest problem was keeping Union officers from interfering with his operation and getting commanders to unload and release equipment expeditiously – a problem which exists to this day.

William W. Wright was a noted construction supervisor with the Construction Corps. He "assisted Herman Haupt in the Maryland Campaign of 1862"⁴⁴ and, subsequently, Daniel McCallum in Tennessee. He facilitated vital repairs on the rail from Bridgeport to Chattanooga. Further, in less than three months, he and his 2,000-person workforce built a new rail line from Kingston Springs to Johnsonville, Tennessee. In early 1864, MG "McCallum appointed Wright the Chief Engineer of Construction in the western operations."⁴⁵ As such, he had the formidable task of rebuilding the Western & Atlantic lines after Sherman's march through Georgia. There, he was assigned the major job of repairing the burned out bridge over the Oostenaula River in northwest Georgia. Although repairs were estimated to take at least four days, General Sherman would not hear of that and directed that Wright have it completed within 48 hours or he, Wright, would be on the front lines. Wright and his crew completed the repairs in 72 hours complaining that it would have been done sooner but the remains of the old bridge were "too hot to handle" when the team began the repairs.⁴⁶ Later, in Morehead City, North Carolina, it took him and his crew less than 20 days to restore the Atlantic & North Carolina railroad back to operation including rebuilding the bridge over the Neuse River. He also ensured that General Sherman had the supply lines he needed during the Battle of Appomattox in Virginia where Grant was by repairing the Wilmington & Weldon railroad ensuring the line was open and operational all the way to Goldsboro.⁴⁷

It is difficult to find any true railroad prime movers in the South as we find in the North. The following accounts will show that while the potential existed to exploit rail power, the South never followed through on any of their initial steps in order to take advantage of this asset.

William Shepperd Ashe was commissioned a major and assistant quartermaster on July 17, 1861. President Davis placed him in charge of rail transportation to the Confederate armies in Virginia and he immediately introduced printed transportation requests.⁴⁸ By October 1861 he had provided "some badly needed regulations to govern the transit of the sick and wounded from the army to the hospitals in Richmond."⁴⁹ He oversaw the successful work on the Petersburg Gap although completion of the project was delayed a month due to contractor

problems. Until his untimely death as a result of a railroad accident in late summer of 1862, Ashe also "endeavored to eliminate discontinuities wherever they existed."⁵⁰ This included his work to join the Central of Georgia Railroad with the Savannah, Albany & Gulf and "the 600 yards which separated the Augusta & Savannah from the other lines entering Augusta."⁵¹

William M. Wadley was appointed Railroad Supervisor in late 1862 and was "charged to take supervision and control of the transportation for the Government on all the railroads in the Confederate States."⁵² While Wadley was appointed to the rank of Colonel, he had no subordinates and his activities "depended on the good will of railway men and military personnel over who he possessed no authority."⁵³ He was able to get several General Orders promulgated which included one that "military officers were again forbidden to interfere with the operation of trains" and a new regulation "placing the conscription of railroad men under"⁵⁴ his control. But, as seen many times before in the South, these were summarily ignored. On numerous occasions, he recommended that the railroads be given the mechanics and supplies they so desperately needed. When these recommendations were "forwarded to General Lee with the suggestion that a greater number of railroad men be detailed from the ranks, they met with a grave refusal."⁵⁵ Throughout his time as transportation supervisor, he never stopped trying to make a difference in the use of railroads during the war. Despite all his efforts he was dismissed in 1863. Though no specific reason could be found for his dismissal speculation abounds. One of the most popular theories is his background. Wadley was from New England and in "1863 Richmond was ringing with criticism of "Yankees" who filled responsible positions in the southern government and army."⁵⁶ The other possible reason was business revenge due to his railway development in Louisiana before the war. Unfortunately we have no way of knowing what the true reason was for his dismissal.

When Wadley departed, his assistant and protégé Frederick W. Sims, was appointed as his successor. Sims was able to have the Railroad Bureau transferred to the Quartermaster Department, which solved one of the problems of his predecessor. Now "there existed a chain of administration between Sims and the thousand and one quartermasters scattered over the Confederacy."⁵⁷ He carried on Wadley's quest to increase supplies to the railroads in order to maintain them. Under his guidance, the Railroad Bureau tried "to concentrate equipment in regions of special strain."⁵⁸ "Sims' principal contribution to the theory of military rail transportation was a proposed consolidation of existing companies into a single, integrated system,"⁵⁹ but, again, without success.

THE BATTLES

"In the beginning of the war military railroads were an experiment: and though some light as to their management had been gleaned by the operations of 1862 and 1863, yet so little progress had been made that the attempt to supply the army of General Sherman in the field, construct and reconstruct the railroad in its rear, and keep pace with its march, was regarded by those who had the largest experience, and who had become most familiar with the subject, as the greatest experiment of all."

Daniel C. McCallum

The existing railroads played a large part in providing both the Union and Confederate armies with men and supplies. Railways "became important by the accident of geography; distances were so great for the Union armies in particular as they advanced that strong communications links were vital."⁶⁰ Using the railroads as just one example, it is clear that neither the military commanders nor their civilian leaders possessed a "clear understanding of such concepts as strategy, operations, and tactics as guides toward perceiving the most effective means of waging war."⁶¹ The following are selected battles that illustrate the significant part the railroads played during the Civil War.

July 1861, "...in the first great battle of the war, victory for the South rode in on the rails."⁶² At First Bull Run, the "confederate troops eluded Union forces assigned to watch them and were rushed by tracks and trains of the Manassas Gap Railroad across the Blue Ridge Mountains. The last brigade of these troops, forming up as they left the cars and marching to the sound of the runs, reached the battlefield of First Bull Run just in time to outflank the Union line and put the attacking forces to rout."⁶³

February 1862 saw the North "moving southward along the Louisville & Nashville railroad intent on breaking through the Confederate line at Bowling Green. This was the Federal approach the South most feared from the beginning."⁶⁴

General Johnston's main objective of the Battle of Shiloh in April of 1862 "was to destroy Grant's army and the results proved one of the greatest railroad victories of the war."⁶⁵ While tactically the Battle of Shiloh was a draw, the subsequent loss of control of the east-west rail line across the tops of Alabama and Mississippi "paralyzed the entire rail transportation of the Confederacy west of Chattanooga and north of Vicksburg. It set up for the Union a network of rail communications which permitted operations as far south as Alabama and Mississippi and as far east as Stevenson, Alabama, without fear of overstretching supply lines."⁶⁶

By the spring of 1862, "the Confederacy already had lost all those rail lines in Kentucky, western Tennessee and Northern Virginia."⁶⁷ "Spring of 1862 marked the beginning of a long

series of feats by which the Yankees repeatedly demonstrated how they outclassed the Confederates in replacing the railroad facilities destroyed by the enemy. The South's lack of equally expert engineers and construction personnel was a great a handicap as its lack of materials."⁶⁸

The Vicksburg Campaign of 1863 could have been fought and won without the use of railroads. With the fall of Vicksburg the "Confederates lost their last through rail connection to the Mississippi and the Southwest."⁶⁹ Without this connection, their two main north-south roads, the Mobile & Ohio and the Mississippi Central "were reduced to minor importance on the outer fringes of the remaining struggle."⁷⁰ The true significance of this campaign is that it cut the Confederacy off from the states west of the Mississippi and gave the Union control over the river.

The Battle of Chickamauga was the "longest and most famous Confederate troop movement."⁷¹ Starting on 9 September 1863, a steady stream of troop trains departed Richmond headed for Georgia – a trip that took 4 days. On 14 September seventeen hundred men, twelve carloads of horses moved over this distance while on 15 and 17 September, five hundred and two thousand men moved respectively. September 19, 1863 saw General Longstreet literally leaping off a train at the little Catoosa Platform and then coaxing his horse to do the same. Within minutes he was riding off in search of Bragg's headquarters and into battle.⁷²

1864 saw another challenge for the railroads during the Atlanta Campaign. Could the railroads be relied on to supply Sherman's Army 300 miles from his main base?⁷³ Nothing of this magnitude had been attempted before and victory depended on it. Sherman knew what this campaign meant and set about making provisions for victory. Initially, he made certain McCallum was brought in as General Manager of the railways within the Departments of Cumberland, the Ohio and the Tennessee. His task was to ensure there were food, munitions and clothing for the soldiers. His first step was to fill the advance depots, which he accomplished. As Sherman advanced, so did the trains. At selected locations Sherman would stop and the trains would move up with rations and unload. Although Sherman knew that raids on his supplies would happen, he was satisfied that his supplies would continue to flow.

THE RESULTS

On May 10, 1869, at Promontory, Utah, tracks of the Union Pacific Railroad coming from the East were joined with tracks of the Central Pacific Railroad from the West. They formed the nation's first transcontinental railroad line. When these two lines joined, the "railroad was seen

as the means to tie this great area (Far West) to the Union. Not only did the railroad, when completed in 1869, fully serve this purpose but it also was a lifeline of the nation in World War II, when great quantities of men and material had to be moved across the continent."⁷⁴

During the Civil War, the railroads proved they could carry more types and sizes of freight under a wide range of conditions than any other means of transportation. Thus, the basic doctrine of the Army Transportation Corps was born: durability, recuperability, capacity and flexibility.⁷⁵ In addition to establishing doctrine, there were numerous innovations from the Civil War that had impact on future military and civilian operations.

"One of the greatest disadvantages of the American railways at the time of the Civil War lay in their differences of gauge. These conditions prevailed until 1866, when the companies adopted a uniform gauge of 4 feet 8 ½ in."⁷⁶ By establishing a standard gauge, trains from one line could move smoothly and swiftly over rails from another line. This aided in the rapid and efficient movement of troops, supplies, and equipment during subsequent crises. Today, rail still serves a vital link for national defense. Every military installation in the United States has rail lines that lead from the installation and connect into the commercial rail lines that service the area, thus providing service to the nearby ports.

As a result of high loss due to wounds and injuries, hospital trains were developed.⁷⁷ Although crude at first with no comfort, the basic concept was instead of trains returning empty from the front to pick up more supplies, wounded soldiers could be placed on them and brought back to better care facilities. This alleviated some of the workload of medics on the battlefield and served to save more lives. As Herman Haupt reported to General Montgomery C. Meigs, Quartermaster General of the Union Army, after the battle at Gettysburg, the rail lines were blocked with trains loaded to support the battle that were never used and finally returned unloaded. He argued that he could have moved more wounded and potentially saved more lives if the rails had been cleared expeditiously.⁷⁸ Our emerging Army doctrine on battlefield casualties parallels this concept for the same reasons. Instead of field hospital set up on the battlefield, soldiers will be triaged and then evacuated to the rear for care, thus minimizing support assets and their vulnerabilities on the ground.

The Union was the first to attempt to put artillery on rail cars in order to make it more mobile and, thus, changed the art of warfare. "It was designed to be pushed in front of the locomotive to a point from which it could shell enemy forces."⁷⁹ An armored car, an artillery piece covered by heavy timbers except for the barrel, patrolled the Philadelphia and Baltimore Central for the North. At the Battle of Seven Pines, the Confederates placed a field gun on a

flatcar to shell the Union forces.⁸⁰ During the Cold War, both the United States and the USSR had rail mounted missile systems. Today, the weapons systems of our Army are all mobile.

There were numerous uses for locomotives that were experimented with during the Civil War. These included the use of locomotive on flatboats to act as a power plant for a pile driver and the engines used to power a gristmill at Port Hudson, LA. The development of new rail techniques such as wrecking cars were later used to pick up locomotives and cars following accidents.⁸¹ They were able to clear the lines swiftly to allow normal traffic to flow again and minimize the impact of derailments.

Finally, opportunities emerged from consolidation of little companies into unified systems.⁸² Once the war was over, companies reviewed their operations and saw considerable advantage in consolidation -some because of financial reasons, others for growth potential. The major rail companies of today can trace their history back to companies that played a part in the Civil War.

Today, as one rides over the modern rail lines and bridges it is easy to forget the important part that railroads played in our nation's history. Without railroads, our mobilization for every subsequent war and conflict would have been greatly impaired. Our nation owes a great deal to those historic railroad men who, over 135 years ago, had a vision and saw it through. Their "experiment" was a success that led to more innovations than even they dreamed possible.

WORD COUNT = 5336

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⁴⁶ Ibid, 145.

⁴⁷ Ibid, 62-63.

⁴⁸ Black, 65.

⁴⁹ Ibid, 66.

⁵⁰ Ibid, 73.

⁵¹ Ibid.

⁵² Ibid, 109.

⁵³ Ibid, 110.

⁵⁴ Ibid, 113.

⁵⁵ Ibid, 114.

⁵⁶ Ibid, 123.

⁵⁷ Ibid, 168.

⁵⁸ Ibid, 172.

⁵⁹ Ibid, 234.

⁶⁰ Bishop, 103.

⁶¹ Russell F. Weigley, A Great Civil War: A Military and Political History, 1861-1865 (Bloomington and Indianapolis: Indiana University Press, 2000), XX.

⁶² Turner, 87.

⁶³ Van Fleet, 14.

⁶⁴ Turner, 116.

⁶⁵ Ibid, 126.

⁶⁶ Ibid.

⁶⁷ Ibid, 134.

⁶⁸ Ibid, 148.

⁶⁹ Ibid, 261.

⁷⁰ Ibid, 261.

⁷¹ Black, 191.

⁷² Turner, 285.

⁷³ Ibid, 322.

⁷⁴ Van Fleet, 13.

⁷⁵ Ibid, 12.

⁷⁶ Edwin A. Pratt, The Rise of Rail-Power in War and Conquest, 1833-1914 (Philadelphia: Lippincott, 1916), 18.

⁷⁷ Turner, 118.

⁷⁸ Abdill, 97.

⁷⁹ Bishop, 103.

⁸⁰ Jack Coggins, Arms and Equipment of the Civil War (Wilmington, N.C.: Broadfoot Publishing Co, 1987), 114.

⁸¹ Abdill, 129.

⁸² Black, 47.

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